

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1.-30. (Canceled).

31. (Currently Amended) A method for purifying metal M_1 particles manufactured by an electrochemical reduction process and containing contaminating impurities in which the particles manufactured by the electrochemical reduction process are heated, melted and resolidified individually, without contact with each other, or a container, the method comprising the steps of :

introducing the metal M_1 particles into a heat source selected from ~~anyone~~any one of a laser, an electric arc, an induction coil, a tube furnace or a gas flame, such that the particles are out of contact with any surfaces and out of contact with each other, at a temperature equal to or higher than the melting point of M_1 so as to cause vaporisation of some or substantially all of the contaminating impurities present;

removing the vaporised contaminating impurities from the vicinity of the particles;

cooling the purified metal M_1 particles; and

collecting the cooled purified metal M_1 particles in solid form.

32. (Withdrawn) A method for the manufacture of a metal alloy article containing a metal M_1 , comprising the steps of:

electrochemically reducing a source of a compound of the general formula M_1X to remove substantially all of element X and provide powder particles consisting substantially of metal M_1 ;

holding the metal powder M_1 in a heat source at a temperature substantially equal to or higher than melting point of M_1 for a period of time sufficient to cause vaporisation of a significant proportion of the one or more impurities;

removing the vaporised impurities;

cooling the purified metal M_1 powder; and

mixing the purified M_1 powder with powder of other alloy components and performing a powder metallurgy process on the mixture to form the alloyed article.

33. (Previously Presented) A method as claimed in claim 31 wherein the particles are in the form of a powder.

34. (Withdrawn) A method as claimed in claim 32 wherein the powder metallurgy process involves powder sintering.

35. (Withdrawn) A method as claimed in claim 32 wherein the powder metallurgy process involves powder pressing or forging.

36. (Canceled).

37. (Previously Presented) A method as claimed in claim 31 conducted in apparatus comprising a heat source, collection means for collecting the purified particles, and separate collection means for collecting the contaminating impurities.

38. (Previously Presented) A method as claimed in claim 31 wherein the particles are permitted to free fall past or within the heat source.

39. (Previously Presented) A method as claimed in claim 38 wherein the free fall distance from the heat source is sufficiently long to allow any M_1 melted by the heat source to re-solidify before collection.

40. (Canceled).

41. (Previously Presented) A method as claimed in claim 31 wherein the step of removing the vaporised impurities involves condensing the vaporised contaminating impurities on cold collector plates positioned adjacent the heat source and disposing of the condensed contaminating impurities.

42. (Previously Presented) A method as claimed in claim 31 wherein the temperature of the heat source is around or above the melting point, but below the boiling point of M_1 .

43. (Previously Presented) A method as claimed in claim 31 wherein M_1 comprises titanium.

44. (Withdrawn) A method as claimed in claim 32 wherein M_1X is titanium oxide TiO_2 .

45. (Previously Presented) A method as claimed in claim 31 wherein the impurities comprise one or more of calcium and calcium chloride.

46. (Withdrawn) A method for the manufacture of a metal alloy article of uniform cross section comprising the steps of:

introducing a continuous source of metal alloy M_1 pellets, manufactured by an electrochemical reduction process, to a processing means;

heating the pellets as they approach the processing means, by free-fall through a heat source, to a temperature substantially equal to or higher than the melting point of M_1 so as to cause vaporisation of some or substantially all of the contaminating impurities present;

removing the vaporised impurities from the vicinity of the pellets;

drawing the metal through the processing means so as to coalesce the pellets to form the desired article; and,

cooling the cast stock.

47. (Withdrawn) A method as claimed in claim 46 for the manufacture of a metal alloy sheet

wherein the processing means is a pair of cooled feed rollers and the cast stock emerges from the cooled feed rollers as an alloy sheet.

48. (Withdrawn) A method as claimed in claim 46 for the manufacture of a uniform cross-section metal alloy stock, comprising the steps of:

introducing the continuous source of pellets of the metal alloy to a shaped crucible;

heating the pellets as specified in claim 46 as they approach the exposed surface of the crucible;

drawing the at least partially molten metal from an opposing surface of the crucible through a die, the die having a cross section of near net shape and dimensions to the desired net shape and dimensions of the required stock; and,

cooling the cast stock.

49. (Withdrawn) A method as claimed in claim 46, wherein the step of heating the pellets is carried out by means of an energy beam selected from an electron beam, a laser or a plasma torch.

50. (Withdrawn) A method as claimed in claim 46, wherein the alloy substantially comprises titanium.

51. (Previously Presented) A method according to claim 31 wherein the cooled metal particles comprise particles up to about 1mm in diameter.

52. (Previously Presented) A method according to claim 31 wherein the particles are in the form of finely-sized metal samples, granules or pellets.

53. (Previously Presented) A method according to claim 31 wherein when the particles are out of contact with any surfaces, they are suspended in mid-air.

54. (Previously Presented) A method according to claim 31 wherein when the particles are out of contact with any surfaces they are within an induction coil.

55. (Canceled).

56. (Previously Presented) A method according to claim 31, wherein the method is conducted in a controlled atmosphere.

57. (Previously Presented) A method according to claim 31, wherein a further purification step comprises water or acid washing and drying of the powder.

58. (Previously Presented) A method according to claim 31, conducted in apparatus comprising a heat source, collection means for collecting the purified particles, and separate collection means for collecting the impurities.

59. (Previously Presented) A method for fabricating purified metal particles comprising spherical particles with a reduced concentration of the contaminating impurities using a method as defined in claim 31.

60. (Previously Presented) A method according to Claim 59, wherein the concentration of the contaminating impurities is less than 50ppm.

61. (Previously Presented) A method according to Claim 59, wherein the concentration of the contaminating impurities is less than 10% of their concentration before purification.

62. (New) A method according to claim 31, in which the metal M_1 particles manufactured by the electrochemical reduction process are individually purified and

spheroidised to form purified M_1 particles which are suitable for use in powder metallurgy processes which are performed at temperatures below the metal M_1 melting temperature.